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RAND/UCSB NETWORK GRAPHICS EXPERIMENT

INTRODUCTION

During the Network Graphics Meeting in July, several experiments were outlined to explore graphics over the Network. One of these was the use of the UCSB On-Line System (OLS) from graphic consoles at Rand.

The connection was completed in the latter half of August and has been used on an experimental basis since then. OLS users from UCSB and TRW (in Los Angeles) have visited Rand and accessed OLS via Rand consoles and the Network. Thus, the first phase of the experiment was completed in August.

We are still in the midst of the second phase of the experiment which involves cleaning up the initial implementation and reviewing and modifying our initial strategies for the OLS connection.

IMPLEMENTATION OF THE EXPERIMENT

UCSB

UCSB has had a Network interface on the OLS for some time. For a description, see RFC #74. The descriptions in RFC #74 were modified to conform to current Network protocols (NCP and ICP) and to conform to what we considered a general graphics description.

Basically, the OLS receives an EBCDIC-like input byte stream and generates an unstructured graphical output stream. These protocols will be documented at the completion of our experimentation and presented at the Network graphics meeting in October.

Rand

The Rand Video-Graphics System (VGS) was used to access the OLS via the Network. The Video-Graphics System and its consoles are described in R-753-ARPA available from the Rand Reports Department.

VGS consoles had been connected previously to the Network via the Rand Network Services Program (NSP). Originally, NSP was designed to afford NCP checkout features, logging in to and use of remote systems and access to UCSB RJE and UCLA RJS. An additional module was easily added to access the OLS.

Input to the OLS was done via a Rand tablet on a VGS console. Input to the OLS module in NSP is accomplished by moving the tablet cursor (not shown in the attached figures) which appears as a small dot on the screen to the desired function button and pressing the tablet pen down on the tablet.

Figure 1 shows the initial display from the OLS module. The top of the screen has a feedback line, the remainder of the upper half is the output display from the OLS, and the lower half is a large sensitive area containing various function buttons (pic-table).

The sensitive areas fall into three classes:

(1) the right most column (CALL, CLOSE) connects/disconnects to OLS over the Network. The third function (COPY) generates hardcopy via an SC 4060. (The figures are, in fact, SC 4060 hardcopy.)

(2) The grid area contains the OLS function buttons normally on a special function keyboard. (See RFC #74.)

(3) The lower area allows entry of number, characters and punctuation.

Figure 2 shows the login sequence to OLS and Figure 3, SIN and COS curves from $-\pi$ to $+\pi$ generated by OLS.

Completion of the Experiment

We plan to present the experiment at the October graphics meeting in two forms. First, a description of the protocols and techniques used in implementing the remote network connection along with conclusions. Second, we will make a film showing the use of the OLS from Rand and present it at the meeting.

UCSB OLS INIT STATE

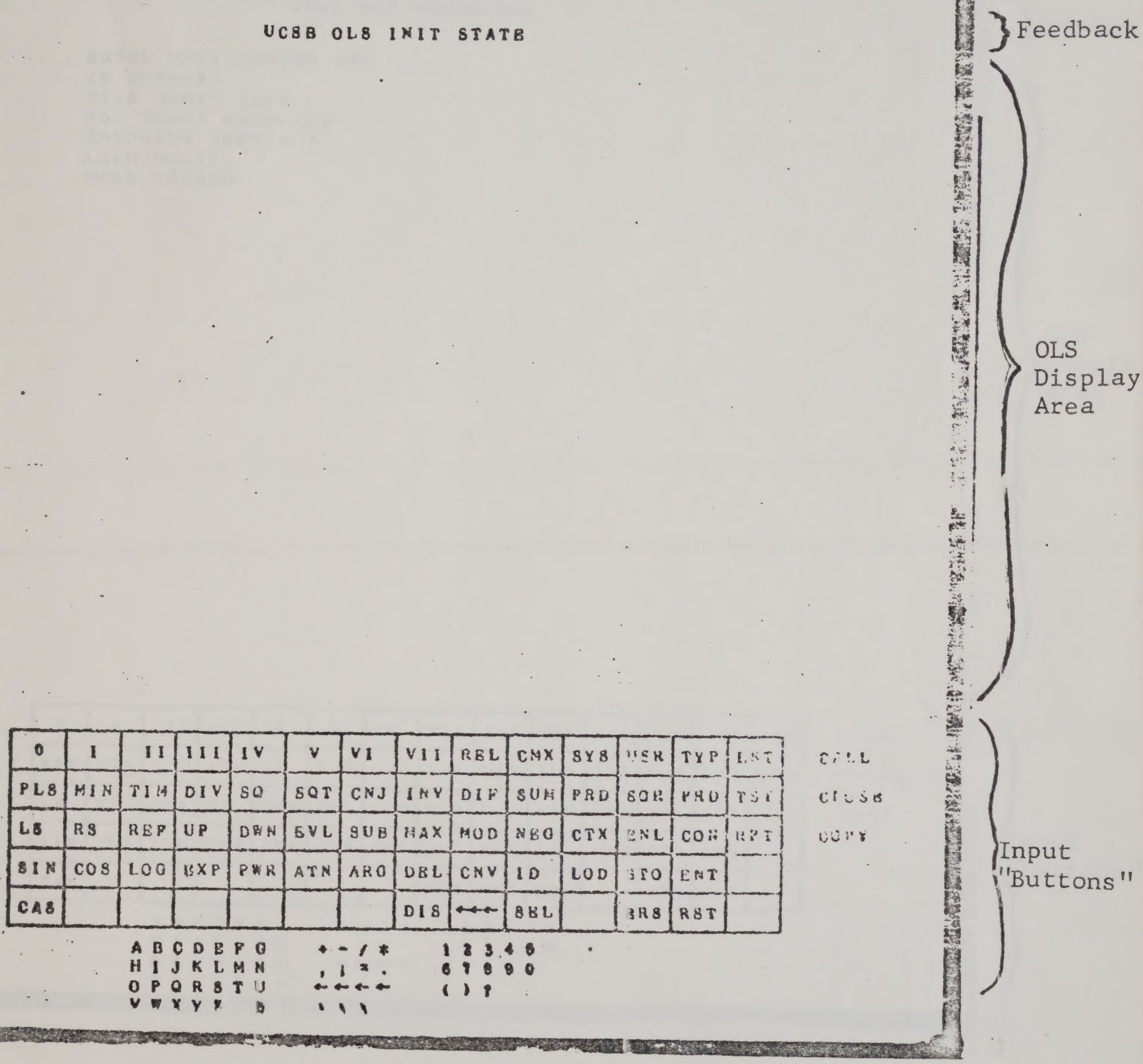

Feedback
OLS Display Area
Input "Buttons"
0 I II III IV V VI VII REL CMX SYS USR TYP INT CALL
PLS MIN TIM DIV SQ SQT CNJ INV DIF SUM PRD SQR PRO TST CLOSE
LS RS REP UP DWN SVL SUB MAX MOD NEG CTX ENL CON RPT COPY
SIN COS LOG EXP PWR ATN ARC DBL CNV ID LOD STO ENT
CAS DIS ← BEL BRS RST
A B C D E F G + - / *
H I J K L M N , ; = .
O P Q R S T U ← ← ← ←
V W X Y Z b \ \ \
1 2 3 4 6
6 7 8 9 0
( ) ?

Figure 1.

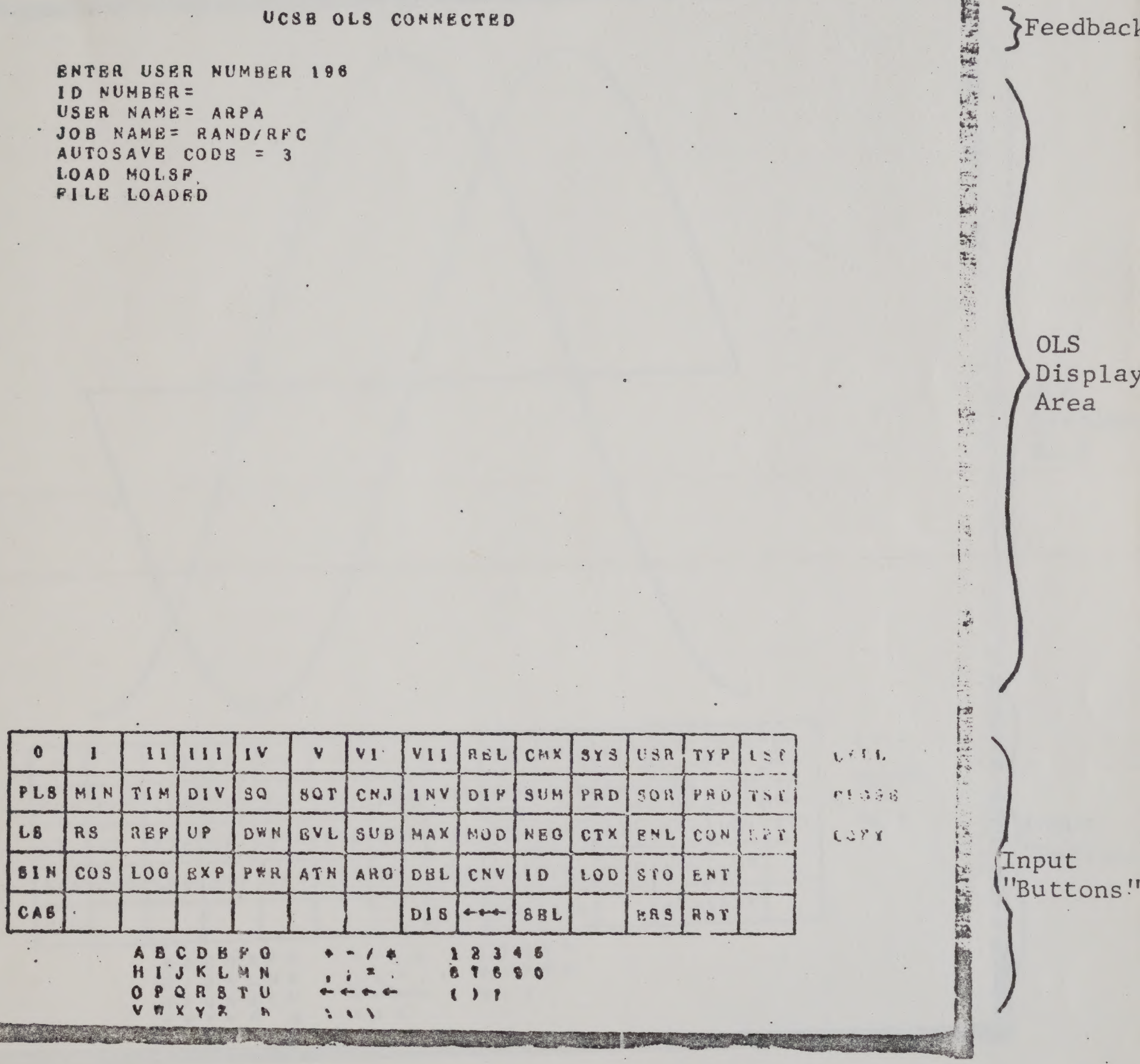
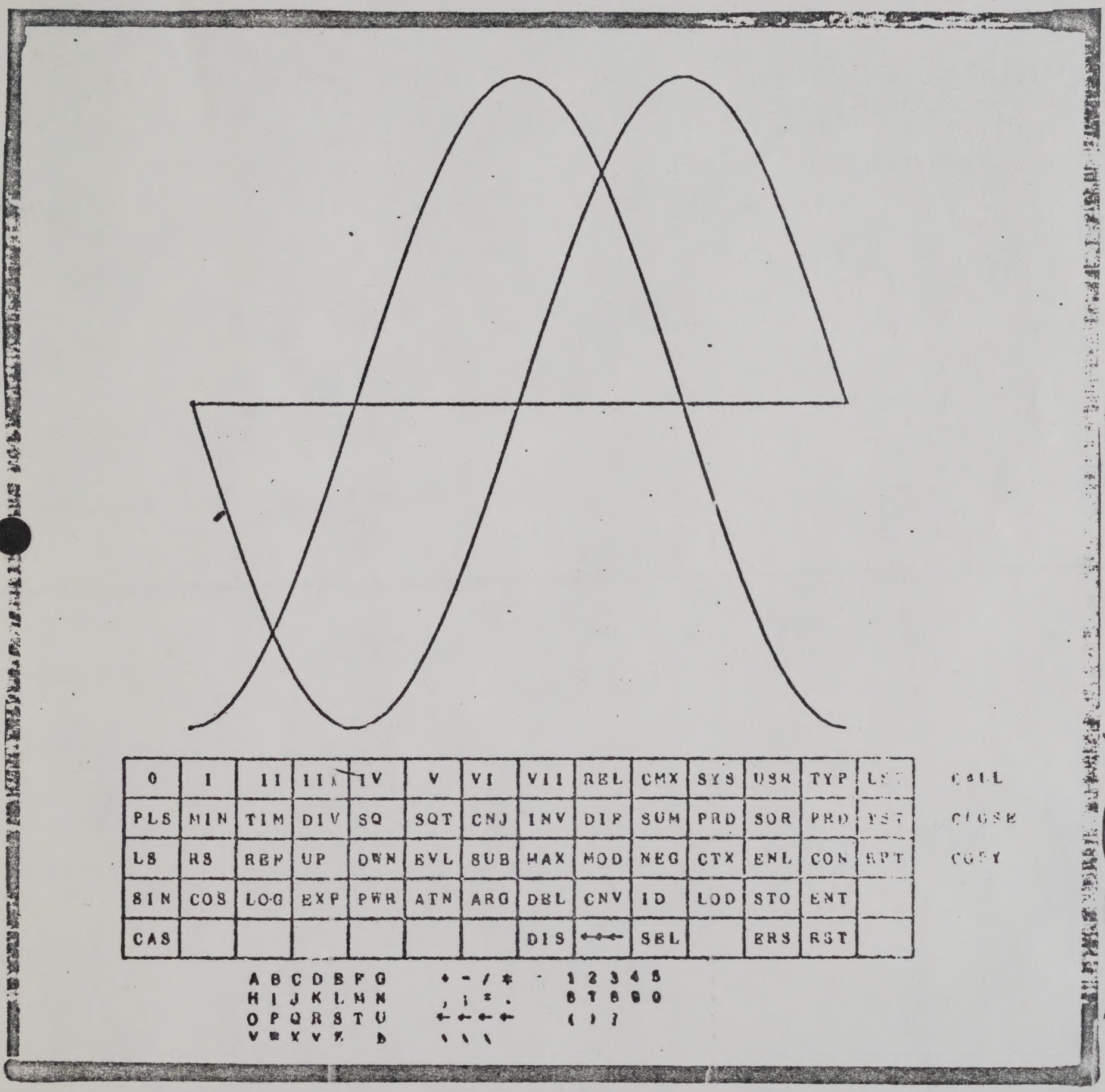

UCSB OLS CONNECTED
ENTER USER NUMBER 196
ID NUMBER=
USER NAME= ARPA
JOB NAME= RAND/RFC
AUTOSAVE CODE = 3
LOAD MOLSP.
FILE LOADED
Feedback
OLS Display Area
0 I II III IV V VI VII REL CMX SYS USR TYP LST CALL
PLS MIN TIM DIV SQ SQT CNJ INV DIF SUM PRD SQR PRD TST CLOSE
LS RS REF UP DWN CVL SUB MAX MOD NEG CTX ENL CON EPT COPY
SIN COS LOG EXP PWR ATN ARC DBL CNV ID LOD STO ENT
CAS DIS SBL ERS RST
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
+ - / * , ; = . ( ) ?
1 2 3 4 5 6 7 8 9 0
Input "Buttons"

Figure 2.


OLS Display Area
Input "Buttons"
0 I II III IV V VI VII REL CMX SYS USR TYP LST
CALL
PLS MIN TIM DIV SQ SQT CNJ INV DIF SUM PRD SQR PRD TST
CLOSE
LS RS REP UP DWN EVL SUB MAX MOD NEG CTX ENL CON RPT
COPY
SIN COS LOG EXP PWR ATN ARG DBL CNV ID LOD STO ENT
CAS DIS SEL ERS RST
A B C D E F G + - / *
H I J K L M N , ; = .
O P Q R S T U ( )]
V W X Y Z
1 2 3 4 5
6 7 8 9 0

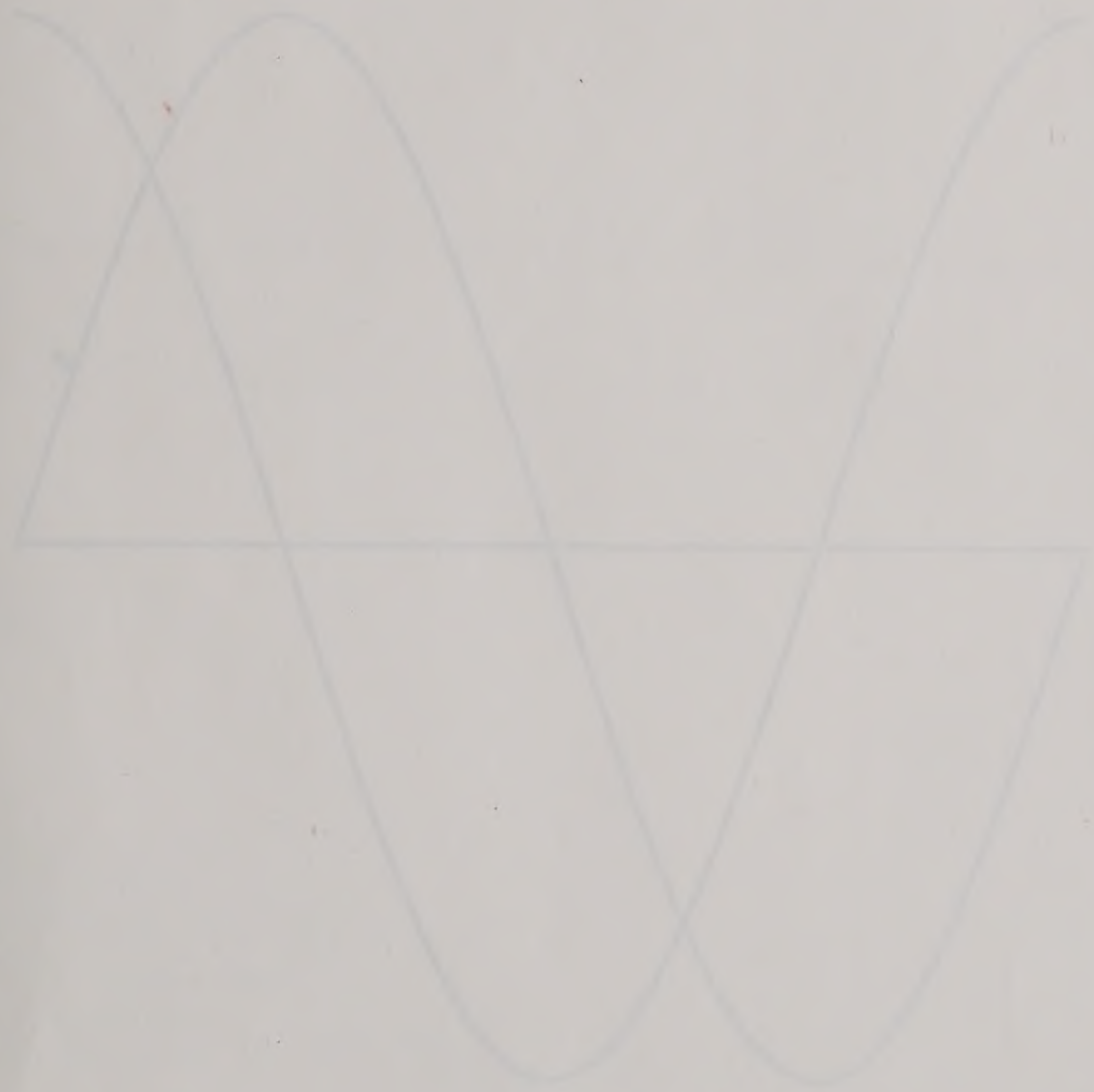



Figure 3.